

It should be appreciated that the **matrix** transfer and transplanting system of the present invention can be adapted to accommodate various size plant trays and multi-pot flats with varying numbers of plant cells and pots formed therein. As illustrations **FIGS. 12 and 13** respectively show the beginning and final positions of 288-cell air-pruning tray **10** being sequentially indexed to transfer and transplant 2 x 4 multi-pot flat **32** in **matrix formation** or 8 plants at each indexing; **FIGS. 14 and 15** respectively illustrate the beginning and final positions of 288-cell air-pruning tray **10** being sequentially indexed to transfer and transplant 3 x 6 multi-pot flat **32** in **matrix formation** or 18 plants at each indexing; and **FIGS. 16 and 17** respectively illustrate the beginning and final positions of 288-cell air-pruning tray **10** being sequentially indexed to transfer and transplant 4 x 8 multi-pot flat **32** in **matrix formation** or 32 plants at each indexing. Once the supply tray **10** comes to the final position, or all plants/seedlings/plugs has been transferred and transplanted, then the empty plant tray **10** is removed from the indexing frame **23**. A new loaded plant tray **10** is placed within the indexing frame **23** or supply tray holding and indexing means **23**.

From the foregoing specification and discussion it is appreciated that the present invention entails a plant tray/container system that lends itself to air-pruning and automated matrix transfer and transplanting with manual or machine operation. The air-pruning tray becomes part of plant transfer and transplanting system for an effective and efficient operation.

The present invention may, of course, be carried out in other specific ways than those herein set forth without parting from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meanings and equivalency range of the appended Claims are intended to be embraced therein.

What is claimed is:

1. A plant transfer and transplanting system comprising:

(a) a movable and/or stationary plant supply tray support/table for receiving a plant tray and wherein the plant tray support/table includes opening(s) formed therein for permitting plant(s) from the plant tray to pass from the plant tray-cell(s) through the opening(s) within the plant tray support/table;

(b) X-Y type indexing frames movably mounted over the supply tray support/table for receiving, holding and indexing supply tray(s).

(c) a movable and/or stationary support/table for receiving multi-pots/flats;
(d) a supporting frame for movably support upper and lower tables and other system components; and
(e) a movable and/or stationary set of pusher plates and matching dibbler plates for dibbling and transplanting into an underlying planting area.

2. The plant transfer and transplanting system of **claim 1** wherein the plant dislodging means includes a set of pusher rods attached on a plate in a matrix formation for a particular supply tray to dislodge a plurality of plants/seedlings/plugs from a supply tray, through the openings within the plant tray support plate in a matrix formation as the opening plate is moved upward or pusher plate is moved downward.

3. The plant transfer and transplanting system of **claim 1** wherein the soil/media dibbling means includes a set of dibblers attached on a plate in a matrix formation for a particular supply tray to dibble a plurality of underlying multi-pot receiving flat in a matrix formation as the multi-pot receiving flat is moved upward or matching dibbler plate is moved downward.

4. The plant transfer and transplanting system of **claim 1** wherein the indexing frames can be indexed in X or Y direction to move the supply tray(s) about the tray supporting table using electrical, hydraulic, pneumatic, mechanical and/or manual means.

5. The plant transfer and transplanting system of **claim 1** wherein the support/table for receiving multi-pots/flats includes manually, semi-automatically or automatically activated indexing/conveying means to transfer the respective plant receiving means to an appropriate planting position under the suction tubes or pushers where the transfer of plants actually takes place and under the dibblers where the dibbling of growth media takes place, operatively in time relationship to the indexing frames/supply trays.

6. The plant transfer and transplanting system of **claim 1** wherein the a supporting frame includes vertical and horizontal frames (with/without casters) for movably support upper and lower supports/tables so that they can move up and down in time relationship with dibbling, plant transferring and transplanting operations.

7. The plant transfer and transplanting system of **claim 1** wherein the plant dislodging means includes one or more impulse vacuum systems for generating impulse vacuum inducing the suction forces to dislodge one or a plurality of plants/seedlings/plugs from a supply tray, through the opening(s) within the plant tray support/table, and conveying through tube into an

underlying planting area.

8. The plant transfer and transplanting system of **claim 7** wherein the impulse vacuum system includes a bellow with the suction tube extending from the opening within the plant tray support/table and the lower end is attached to the telescoping tube inside the bellow with a flexible door ant its end; and an actuator for creating relative movement to expend the bellow to generate impulse vacuum at the suction tube which in turn induces a plant from the plant tray downwardly through the opening(s) within the plant tray support/table and conveying through tube into an underlying planting area.

9. The plant transfer and transplanting system of **claim 7** wherein the bellow includes pyramid shaped bellow so as to create a relatively larger initial impulse vacuum as the bellow is extended and retracted during the process of creating an impulse and an intermittent vacuum.

10. The plant transfer and transplanting system of **claim 7** wherein the outlet tube at the lower end of bellow includes a flexible door arrangement that will close tight in response to a vacuum created in the bellow thereby causing a plant to be ejected downward and to shoot through the flexible door arrangement to effectuate plant transfer and transplanting.

11. A method of matrix plant transfer and transplanting system comprising:

(a) selecting a matrix pattern of underlying multi-pot receiving flat and matching opening plate, dibbler plate and pusher plate within one or a group of plant supply trays;

(b) pushing down selected plants according to the matrix pattern to perform the transfer and transplanting; and thereafter

(c) sequentially shifting the entire supply tray or trays to a second position such that another like matrix of plants can be transferred and wherein this process is continued until the entire supply tray or trays are emptied and the plants are transplanted into an underlying planting area.

12. The method of **claim 11** including the step of exchanging with different set of receiving flat and matching opening plate, dibbler plate and pusher plate within the same one or the same group of plant supply trays.

13. The method of **claim 11** including the step of exchanging with different set of receiving flat and matching opening plate, dibbler plate and pusher plate within the different one or different group of plant supply trays.

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